

January 12, 2000

Imperial and Brawley Wetland Planting and Maintenance Suggestions

Planting beds and planting -

I understand wind gusts can be intense in this area. I, therefore, suggest that the planting bed areas be built up higher than necessary to allow for wind and wave erosion, and to reinforce the planting bed areas on the leeward sides to minimize erosion.

As much as practical, I suggest that heavy machinery be kept off the planting beds. Any topsoil on the surface should remain in place. As with the planting of any crop, the planting bed surfaces should be broken up to allow root penetration by the new plants. The type of implement to be used depends upon the soil makeup, the amount of debris on the surface, and the soil compaction that may have occurred. Assuming the soils are more sandy loam than clay, I suggest using a field cultivator to coarsely break up the soil followed by a disk to chop the soil chunks into finer material and any existing vegetation into mulch. At the Brawley site, if the clay is fairly heavy, a chisel plow followed by a disk may work better. Proper soil preparation will hasten good plant establishment. Unless provisions are made to provide irrigation to the plants immediately following planting, the wetland planting beds must be thoroughly saturated before planting can begin.

Of the five plant species currently being propagated for this project, only the hardstem bulrush (*Schoenoplectus acutus*)* can survive in 12 inch water depths. Baltic rush (*Juncus balticus*) and Santa Barbara sedge (*Carex barbarae*) prefer moist soil conditions and can generally withstand only occasional inundations of just a couple of inches. Saltmarsh bulrush (*Bolboschoenus maritimus*)* and alkali bulrush (*Bolboschoenus robustus*)* thrive in moist soil conditions as well as in several inches of water, but no more than about six inches for any length of time. Therefore, of those species, only hardstem bulrush should be planted at the Brawley site and in ponds 3, 4, and 5 at the Imperial sites as the sites are currently designed. The other four species could be planted in the shallower areas around the islands of pond 6. If a variety of plant species is desired in more of the planting areas, then additional soil should be left in place to provide shallower water depths. Additionally, normal pond operation levels could be lowered to achieve the shallower water depths as necessary for alternative species.

Although the plants need not be planted in perfect rows exactly 1 or 2 feet from the previous one, I recommend that the hardstem bulrush in Imperial ponds 3, 4, and 5 be planted fairly regularly in alternating rows to provide a uniform filter for the water to move through without short-circuiting. The plants in pond 6 should be planted more randomly but according to their water depth requirements. These plants can be planted in clumps with several other plants or with other species (see planting details on Drawing # 1608-D-48). These areas should be made to appear natural with the larger plant species (saltmarsh and alkali bulrush) lower in the water (no more than 6 inches of water depth) and the smaller species higher up the slope in moist soil.

Plant density -

Planting on **one** foot centers offset on alternate rows requires about 158,000 plant plugs for the Imperial site. Planting on **two** foot centers offset on alternate rows requires about 40,000 plants. At the Brawley site about 50,000 plant plugs are required if planted on **one** foot centers, or about 13,000 are required if planting on **two** foot centers. These numbers are rounded but do not include extra plants for possible replanting. Our recommended planting scheme is illustrated on Drawing # 1608-D-48. We suggest planting at the higher plant density (one foot centers) along the leeward side of the 12" planting beds to help protect those areas from wind and wave erosion. The two foot center planting density could then be used for the remaining areas of the planting beds. For the shallower planting areas, we suggest maintaining an average density of one foot centers but clumping them as illustrated in the planting details on Drawing #1608-D-48.

Local botanists claim that if a dense planting density is not used, weedy species such as common reed (*Phragmites spp.*), cattails (*Typha spp.*) and saltcedar (*Tamarix spp.*) will invade and quickly dominate the wetland. They recommend planting the new plant plugs on one foot centers. This also would make it less likely for the necessity of replanting if a fairly high percentage of plugs failed to survive.

From my experience, I believe that planting the hardstem bulrush plant plugs on two foot centers across the majority of the area is adequate to establish them within a growing season. Undesirable plants can be discouraged by planting larger bulrush plants (9-12" tall) that can survive water depths that would otherwise drown newly germinating seed (3+” for common reed and saltcedar and 6+” for cattail) (Armstrong et al. 1999; Shrader 1977; and John Taylor, pers. com. 2000). Due to the shallower depths required by the four other species, planting them on an average of one foot centers is a good idea for the purpose of out competing undesirable species.

Within the constructed wetlands near San Jacinto, California, we successfully transplanted large root clumps of hardstem and California bulrush (*Schoenoplectus californicus*)* on **four** foot centers. The plants propagated rapidly in the warm temperatures and abundant nutrients. No replanting was necessary, virtually every bulrush plant clump survived, and invasive weeds were never a problem. The root clumps were planted on dry soil with stakes to hold them in position. Water levels were immediately raised to 3 inches and then to 6 inches within two weeks, thus drowning any germinating seeds. The Eastern Municipal Water District (EMWD) has offered bulrush plants from their research and nursery cells to anyone who submits a request in writing to Christie Crother (909-928-3777, ext. 4228), Senior Water Resources Planning Analyst, to harvest the plants at no cost or liability to the EMWD. Likewise, Mike Massingill (619-452-5765), V.P. of Production at Kent SeaTech, has offered hardstem and California bulrush plants from their constructed wetlands located just north of the Salton Sea.

Plant maintenance -

It is imperative that the water levels are monitored carefully during planting and for several months after to insure the necessary conditions for the plants to establish and thrive. This is especially critical where water depths are variable (i.e., pond 6) and therefore difficult to maintain moist soils at the higher elevations while not drowning new shoots at the lower elevations.

It will also be imperative to control invasive plant species from getting established. A program must be developed to maintain constant vigilance over removing invasive plants as they germinate in moist soil areas. Costs for removal are far cheaper when control efforts are done while the plants are very small than after they form rhizomes and extensive root systems.

* *Schoeneoplectus acutus*, *Schoenoplectus californicus*, *Bolboschoenus maritimus*, and *Bolboschoenus robustus* were all previously in the *Scirpus* genus. They have recently been renamed to the above (Galen Smith, 1999, personal communication).

Literature Cited

Armstrong, J., F. Afreen-Zobayed, S. Blyth, and W. Armstrong. 1999. *Phragmites australis*: effects of shoot submergence on seedling growth and survival and radial oxygen loss from roots. Aquatic Botany 64:275-289.

Shrader, T.H. 1977. Selective management of phreatophytes for improved utilization of natural foodplain resources. *In*: Water Management for Irrigation and Drainage, Proc. Soc. Civil Engineers 2:16-44.

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